What is claimed is:

1. An active sound reduction apparatus comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one sound tube or a plurality of sound tubes of a length which is nearly 1/4 of a wavelength or wavelengths of one sound wave or a plurality of sound waves other than a control target frequency of the active acoustic control cell, the one sound tube or the plurality of sound tubes being provided on a side of the active acoustic control cell facing a sound source to be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or on both of the sound source side and the opposite side of the active acoustic control cell.

2. An active sound reduction apparatus comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one sound tube or a plurality of sound tubes of

a length which is nearly 1/4 of a wavelength or wavelengths of one sound wave or a plurality of sound waves other than a control target frequency of the active acoustic control cell, the one sound tube or the plurality of sound tubes being provided on a side of the active acoustic control cell facing a sound source to be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or on both of the sound source side and the opposite side of the active acoustic control cell, and wherein

a sound absorption material is disposed at a bottom of the sound tube to avoid an amplifying effect on a sound wave corresponding to a length which is nearly a half of a wavelength of a sound wave whose sound pressure is decreased by the sound tube.

3. An active sound reduction apparatus comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one sound tube or a plurality of sound tubes of a length which is nearly 1/4 of a wavelength or wavelengths of one sound wave or a plurality of sound waves other than a control target frequency of the active

acoustic control cell, the one sound tube or the plurality of sound tubes being provided on a side of the active acoustic control cell facing a sound source to be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or on both of the sound source side and the opposite side of the active acoustic control cell, and wherein

an acoustic resistor, such as a porous plate, is disposed inside the sound tube to avoid an amplifying effect on a sound wave corresponding to a length which is nearly a half of a wavelength of a sound wave whose sound pressure is decreased by the sound tube.

4. An active sound reduction apparatus comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one sound tube or a plurality of sound tubes of a length which is nearly 1/4 of a wavelength or wavelengths of one sound wave or a plurality of sound waves other than a control target frequency of the active acoustic control cell, the one sound tube or the plurality of sound tubes being provided on a side of the active acoustic control cell facing a sound source to

be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or on both of the sound source side and the opposite side of the active acoustic control cell, and wherein

an acoustic resonator is disposed inside the sound tube to avoid an amplifying effect on a sound wave corresponding to a length which is nearly a half of a wavelength of a sound wave whose sound pressure is decreased by the sound tube.

5. An active sound reduction apparatus comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one acoustic resonator or a plurality of acoustic resonators tuned to a frequency or frequencies other than a control target frequency of the active acoustic control cell in order to decrease a sound pressure at the frequency or frequencies, the one acoustic resonator or the plurality of acoustic resonators being provided on a side of the active acoustic control cell facing a sound source to be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or

on both of the sound source side and the opposite side of the active acoustic control cell.

6. An active sound reduction apparatus comprising a plurality of active sound reduction apparatuses combined together, each of said active sound reduction apparatuses comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one sound tube or a plurality of sound tubes of a length which is nearly 1/4 of a wavelength or wavelengths of one sound wave or a plurality of sound waves other than a control target frequency of the active acoustic control cell, the one sound tube or the plurality of sound tubes being provided on a side of the active acoustic control cell facing a sound source to be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or on both of the sound source side and the opposite side of the active acoustic control cell.

7. An active sound reduction apparatus comprising a plurality of active sound reduction apparatuses combined together, each of said active sound reduction

apparatuses comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one sound tube or a plurality of sound tubes of a length which is nearly 1/4 of a wavelength or wavelengths of one sound wave or a plurality of sound waves other than a control target frequency of the active acoustic control cell, the one sound tube or the plurality of sound tubes being provided on a side of the active acoustic control cell facing a sound source to be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or on both of the sound source side and the opposite side of the active acoustic control cell, and wherein

a sound absorption material is disposed at a bottom of the sound tube to avoid an amplifying effect on a sound wave corresponding to a length which is nearly a half of a wavelength of a sound wave whose sound pressure is decreased by the sound tube.

8. An active sound reduction apparatus comprising a plurality of active sound reduction apparatuses combined together, each of said active sound reduction

apparatuses comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one sound tube or a plurality of sound tubes of a length which is nearly 1/4 of a wavelength or wavelengths of one sound wave or a plurality of sound waves other than a control target frequency of the active acoustic control cell, the one sound tube or the plurality of sound tubes being provided on a side of the active acoustic control cell facing a sound source to be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or on both of the sound source side and the opposite side of the active acoustic control cell, and wherein

an acoustic resistor, such as a porous plate, is disposed inside the sound tube to avoid an amplifying effect on a sound wave corresponding to a length which is nearly a half of a wavelength of a sound wave whose sound pressure is decreased by the sound tube.

9. An active sound reduction apparatus comprising a plurality of active sound reduction apparatuses combined together, each of said active sound reduction

apparatus comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one sound tube or a plurality of sound tubes of a length which is nearly 1/4 of a wavelength or wavelengths of one sound wave or a plurality of sound waves other than a control target frequency of the active acoustic control cell, the one sound tube or the plurality of sound tubes being provided on a side of the active acoustic control cell facing a sound source to be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or on both of the sound source side and the opposite side of the active acoustic control cell, and wherein

an acoustic resonator is disposed inside the sound tube to avoid an amplifying effect on a sound wave corresponding to a length which is nearly a half of a wavelength of a sound wave whose sound pressure is decreased by the sound tube.

10. An active sound reduction apparatus comprising a plurality of active sound reduction apparatuses combined together, each of said active sound reduction

apparatus comprising:

an active acoustic control cell, disposed on an upper end surface of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at the upper end surface is actively reduced; and

one acoustic resonator or a plurality of acoustic resonators tuned to a frequency or frequencies other than a control target frequency of the active acoustic control cell in order to decrease a sound pressure at the frequency or frequencies, the one acoustic resonator or the plurality of acoustic resonators being provided on a side of the active acoustic control cell facing a sound source to be subjected to sound reduction, or on a side of the active acoustic control cell opposite to the sound source, or on both of the sound source side and the opposite side of the active acoustic control cell.

11. An active noise insulation wall comprising a plurality of the active sound reduction apparatuses of any one of claims 1 to 10, the active sound reduction apparatuses being disposed in a row along a longitudinal direction of an upper end surface of a noise insulation wall or a side surface of an upper portion of the noise insulation wall.

12. An active noise insulation wall comprising a plurality of the active sound reduction apparatuses of any one of claims 1 to 10, the active sound reduction apparatuses being disposed in a row along a longitudinal direction of an upper end surface of a noise insulation wall or a side surface of an upper portion of the noise insulation wall, and wherein

the active sound reduction apparatuses are mounted on an upper portion of the noise insulation wall so as to be normally and reversely rotatable in a vertical plane.

13. An active noise insulation wall comprising a plurality of the active sound reduction apparatuses of any one of claims 1 to 10, the active sound reduction apparatuses being disposed in a row along a longitudinal direction of an upper end surface of a noise insulation wall or a side surface of an upper portion of the noise insulation wall, and wherein

at least one of the sound tubes of the active sound reduction apparatuses has a bottom portion entering a depression of an upper end portion of the noise insulation wall.

14. An active noise insulation wall comprising a plurality of the active sound reduction apparatuses of any one of claims 1 to 10, the active sound reduction

apparatuses being disposed in a row along a longitudinal direction of an upper end surface of a noise insulation wall or a side surface of an upper portion of the noise insulation wall, and wherein

the noise insulation wall branches at an upper end portion thereof to have a plurality of branch walls extending upward, and

the active sound reduction apparatus is disposed either between two of the branch walls, or on a side of one of or the plurality of the branch walls facing a noise source, or on a side thereof opposite to the noise source.

15. An active noise insulation wall having a plurality of rows formed by spacing the adjacent rows by a predetermined distance, each of the rows being formed from a plurality of active acoustic control cells, disposed in a longitudinal direction of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at an upper end surface of the noise insulation wall is actively reduced.

16. An active noise insulation wall having a plurality of rows formed by spacing the adjacent rows by a predetermined distance, each of the rows being formed from a plurality of the active sound reduction

apparatuses of any one of claims 1 to 10, which are disposed in a longitudinal direction of the noise insulation wall.

17. An active noise insulation wall having a plurality of rows formed by spacing the adjacent rows by a predetermined distance, each of the rows being formed from a plurality of active acoustic control cells, disposed in a longitudinal direction of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming noise at an upper end surface of the noise insulation wall is actively reduced, and wherein

noise killer cells are disposed, on one of the rows facing a noise source, for generating a sound wave interfering with a sound wave traveling rectilinearly from the noise source after passing over an upper end portion of the noise insulation wall to decrease the sound wave traveling rectilinearly.

18. An active noise insulation wall having a plurality of rows formed by spacing the adjacent rows by a predetermined distance, each of the rows being formed from a plurality of active acoustic control cells, disposed in a longitudinal direction of a noise insulation wall, for controlling a coming noise such that a diffracted sound pressure component of the coming

noise at an upper end surface of the noise insulation wall is actively reduced, and wherein

composite noise killer cells having functions of a noise killer cell and the active acoustic control cell are disposed on one of the rows facing a noise source, the noise killer cell being adapted to generate a sound wave interfering with a sound wave traveling rectilinearly from the noise source after passing over an upper end portion of the noise insulation wall to decrease the sound wave traveling rectilinearly.

19. An active noise insulation wall having a plurality of rows formed by spacing the adjacent rows by a predetermined distance, each of the rows being formed from a plurality of the active sound reduction apparatuses of any one of claims 1 to 10, which are disposed in a longitudinal direction of the noise insulation wall, and wherein

noise killer cells are disposed, on one of the rows facing a noise source, for generating a sound wave interfering with a sound wave traveling rectilinearly from the noise source after passing over an upper end portion of the noise insulation wall to decrease the sound wave traveling rectilinearly.

20. An active noise insulation wall having a plurality of rows formed by spacing the adjacent rows

by a predetermined distance, each of the rows being formed from a plurality of the active sound reduction apparatuses of any one of claims 1 to 10, which are disposed in a longitudinal direction of the noise insulation wall, and wherein

composite noise killer cells having functions of a noise killer cell and the active acoustic control cell are disposed on one of the rows facing a noise source, the noise killer cell being adapted to generate a sound wave interfering with a sound wave traveling rectilinearly from the noise source after passing over an upper end portion of the noise insulation wall to decrease the sound wave traveling rectilinearly.

21. A composite noise killer cell comprising:

noise detection means, such as a microphone, disposed on a straight line connecting a noise source to an upper end portion of a noise insulation wall;

one computation means for issuing a signal for generating a killer sound for noise based on the noise detected by the noise detection means;

diffracted sound detection means, such as a microphone, for detecting a sound wave diffracting at the upper end portion of the noise insulation wall and leaking to an outside;

other computation means for issuing a signal for generating a killer sound for a diffracted sound based

on the diffracted sound detected by the diffracted sound detection means;

mixing means for mixing the signal issued by the one computation means and the signal issued by the other computation means; and

sound wave generation means, such as a speaker, driven by an output signal of the mixing means to generate a sound wave for decreasing both a sound wave traveling rectilinearly from the noise source and reaching the outside of the noise insulation wall, and a sound wave diffracting at the upper end portion of the noise insulation wall and reaching the outside.